

SiC Matrix Composites for High Temperature Hypersonic Vehicle Applications, Phase I

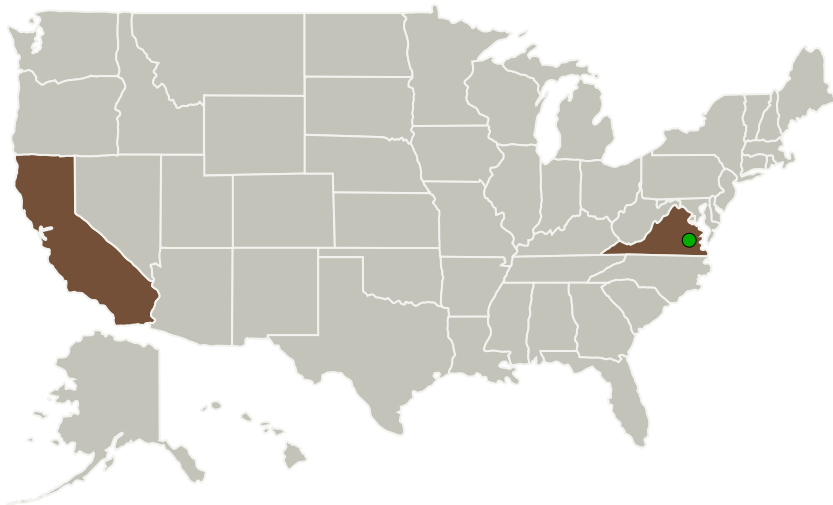
Completed Technology Project (2010 - 2010)



Project Introduction

Durable high temperature materials are required for hypersonic engine and structural thermal protection systems. In particular, 2700°F or greater capable structural materials that can survive stresses on the order of 10 ksi (70 MPa) for at least 100 hours in an oxidizing environment have been identified as an enabling material for future hypersonic vehicles with a long term desired target of 3000°F. As these applications are structural, a strong degree of damage tolerance is desired, and thus ceramic matrix composites are the primary choice due to the desire for reduced weight, high temperature strength and oxidation resistance. Silicon carbide fiber-reinforced silicon carbide matrix (SiC/SiC) composites are believed to be the most suitable solution due to meeting the requirements with the exception of creep at the highest temperatures/loads. The proposed effort will modify the SiC fiber preform by the addition of a fraction of more creep resistant carbon fibers. The Phase I will encompass engineering the appropriate level of hybridization in a C-SiC/SiC composite, producing and evaluating the ceramic composite material for hypersonic vehicle applications, including stress rupture at temperatures of 2700°F or greater.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
Rolls-Royce High Temperature Composites Inc	Lead Organization	Industry	Huntington Beach, California
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

▶ **January 2010:** Project Start

✓ **July 2010:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139930>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Rolls-Royce High Temperature Composites Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

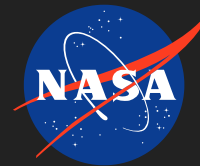
Robert Shinavski

Co-Investigator:

Robert Shinavski

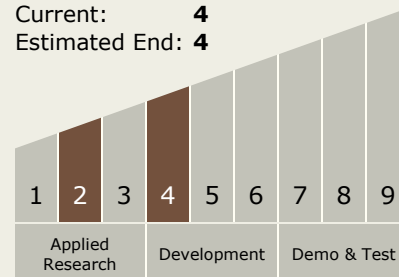
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Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.3 Power Management and Distribution
 - └ TX03.3.4 Advanced Electronic Parts

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System